



STATE & PRIVATE FORESTRY
FOREST HEALTH PROTECTION
SOUTH SIERRA SHARED SERVICE AREA



Report No. SS22-01

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To: Jason Kuiken, Forest Supervisor, Stanislaus National Forest
Andrew Welsh, District Ranger, Mi Wok Ranger District

From: State and Private Forestry, Forest Health Protection, South Sierra Shared Service Area

Subject: Insect Concerns in South 108 Underburn, Mi Wok Ranger District, Stanislaus National Forest

Background

A 70-acre prescribed fire on Mount Provo (Mi Wok Ranger District, Stanislaus National Forest, Tuolumne County) was conducted in late November to December 2021. Forest Health Protection (FHP) was requested to examine the burn area in February 2022 as an undesirable number of tree crowns in and around the burn perimeter were turning off-color. This report summarizes observations and recommendations from FHP after a field visit to the site.

Observations

FHP visited the burn on February 17, 2022 to assess any agents or possible causes other than fire injury to account for crown color changes in residual trees. This unit is partially an older ponderosa pine plantation with average stem diameters in the pine plantation ranging from 10-15 inches DBH, with mature natural stands on the northeastern side. There is incense cedar, Douglas-fir, canyon live oak, and white leaf manzanita interspersed among larger, mature pines. Much of the brush inside the burn unit was cut and removed; most seedling and sapling-sized trees were consumed by fire.

At the northern end of the burn unit, there were varying levels of crown and bole scorch on residual trees. Bole scorch was not very severe on the largest pines, as bark removal found only the most outer bark was singed and did not penetrate very deep into the inner bark (see photo 1). Crown scorch did show that specific spots got fairly hot: whole crowns of the tallest pines had turned color but needles were not directly burned. Many of these trees would be considered 90-95% crown scorched qualifying in the R5 fire-injury marking guidelines (Smith and Cluck 2011) that these trees would still survive at a Probability mortality of 70% and higher pre-bud break (see photo 2). Pitch streamers were oozing where bole scorch was hottest, but most were free of boring dust indicating insect attack at the time of survey.

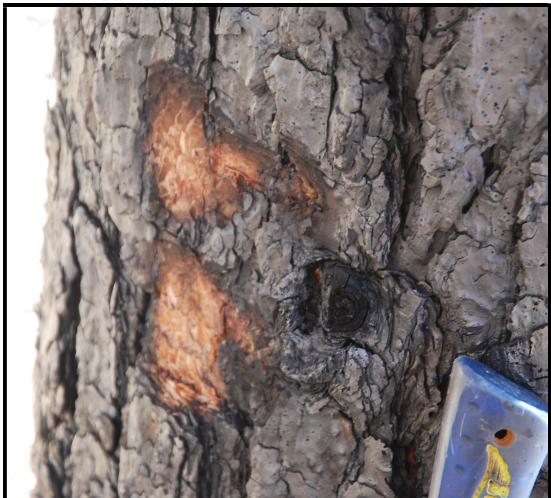


Photo 1. Examining scorch on green pines.



Photo 2. Pines with >90% crown scorch; still green tips at terminal.

FHP did find older bark beetle and pine engraver activity that occurred prior to the fire – estimated to have been killed in 2021 and now fading in response to beetle-kill than fire effects. The highest insect activity was located on the southwestern edge of the burn, across the road (north of E on the map, Appendix A). Only two older attacked ponderosa pines were found in the burn perimeter, while all others were on the other side of the road (see photo 3). Beetles had long emerged from these two pines, indicating their death occurred prior to burn. Insect infested trees on the lower side of the road were identified by crown fade starting from the top, moving downward with heavy bark flecking on the bole from woodpecker foraging (see photos 4 and 5). About 30 trees, averaging 15 inches DBH were noted with old WPB galleries and exit holes – indicating beetles had reproduced and next generations already flown. Pine engravers (*Ips spp.*) fed in smaller adjacent pines (around eight trees), also leaving similar signs. Evidence of weakened trees was noted that three of the largest trees were not fully mass-attacked, but only infested from 10 feet and above; and whole tree still declining. The only other pest activity observed was pine engraver lower along the 2N09 road, in four small ponderosa pines and appeared to be 2021 attack.



Photo 3. Pines on left side of road killed by bark beetles, trees on right affected by fire.

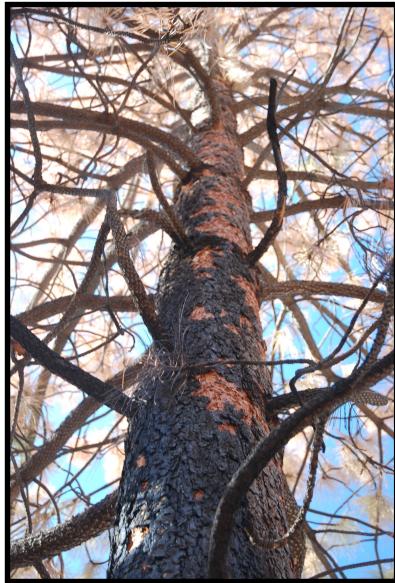


Photo 4 & 5. Woodpecker foraging for beetle larvae under the bark; galleries of bark beetles confirmed on trees.

Discussion of Proposed Management Alternatives

The prescribed burn was successful in removing and killing most of the shrub and smaller trees in the understory, while maintaining a fairly low scorch on most residual trees. Some pockets did experience high temperatures that caused needle death, but terminals still survived.

Based on the percentage of trees that have >70% crown scorch, and the proximity of active beetle populations, there is a good potential for more beetles to move into the treated unit. The pulse of highest risk for beetle attack occurs in the first 2-3 years post-burn (Davis et al. 2012) and the proximity of the current infestation is worrisome. In combination with current drought conditions, neighboring beetle activity, and scorch on recovering trees, this may result in undesirable additional mortality. Western pine beetle (*Dendroctonus brevicomis*) is highly attracted to weakened and stressed trees, and mechanical injury only exacerbate their success in finding and infesting hosts. While WPB has not been recorded to move *outward* from burned sites into green stands, the potential for them to move into burned sites is much more likely. During the last drought event, older ponderosa pines were especially vulnerable to nearly 90% loss from beetles compared to other conifers (Fettig et al. 2019). The proportion of similar sized ponderosa pines, stocking and basal area put this area is at high risk. Review of past 80 years of bark beetle infestations in western forests suggest that bark beetle pressure is becoming more severe, resulting in higher mortality levels than in the past century (Egan et al. 2019). Water predictions that no further precipitation is expected for the state do not bode well for trees trying to recover. If the current drought continues to persist, then residual trees will be susceptible to bark beetle attack this summer.

Follow-up

FHP revisited this site in May 2022 as some beetle activity was expected based on site conditions, and current year beetles already found emerging in other parts of the forest. A group of pines within the burn perimeter were found with attacks of western pine beetle and red turpentine beetle (*Dendroctonus valens*). An estimated 15 trees were attacked in this group, but some only within the bole scorch (see photo 6 and 7). However, the extent of the scorch and the number of attacks even partially may likely lead to the demise of these trees. No other mortality was noted within the unit, but multiple groups of recent beetle activity was observed on the west face of the mountain (see photo 7).



Photo 6. Trees with WPB strip attacks only along the bole scorch (photo 6).



Photo 7. West face of Mt. Provo with multiple groups of recent bark beetle activity noted.

It is recommended to keep monitoring this area due to the high level of activity on the west face of Mount Provo. Further treatment may be needed to mitigate subsequent bark beetle mortality if winter precipitation remains below average. If there are further questions regarding concerns regarding this report or regional fire-marking guidelines, please do not hesitate to contact me.

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References.

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Fettig, C.J., L. Mortensen, B. Bulaon, and P. Foulk 2019. Tree mortality following drought in the central and southern Sierra Nevada, California, USA. *Forest Ecology and Management* 432: 164-178.

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**South Sierra Shared Service Area
Stanislaus National Forest
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Appendix A. Map of South 108 Underburn.

